International Biometric Performance Testing Conference 2014

NIST Gaithersburg, MD

1 – 3 April 2014

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Performance Measurement in ABC and Surveillance Scenarios

- **Why Automated Border Clearance**
- **What are ABC Performance measures**
- **How well do ABC implementations perform**
- **How well can passive (surveillance) ABC perform**

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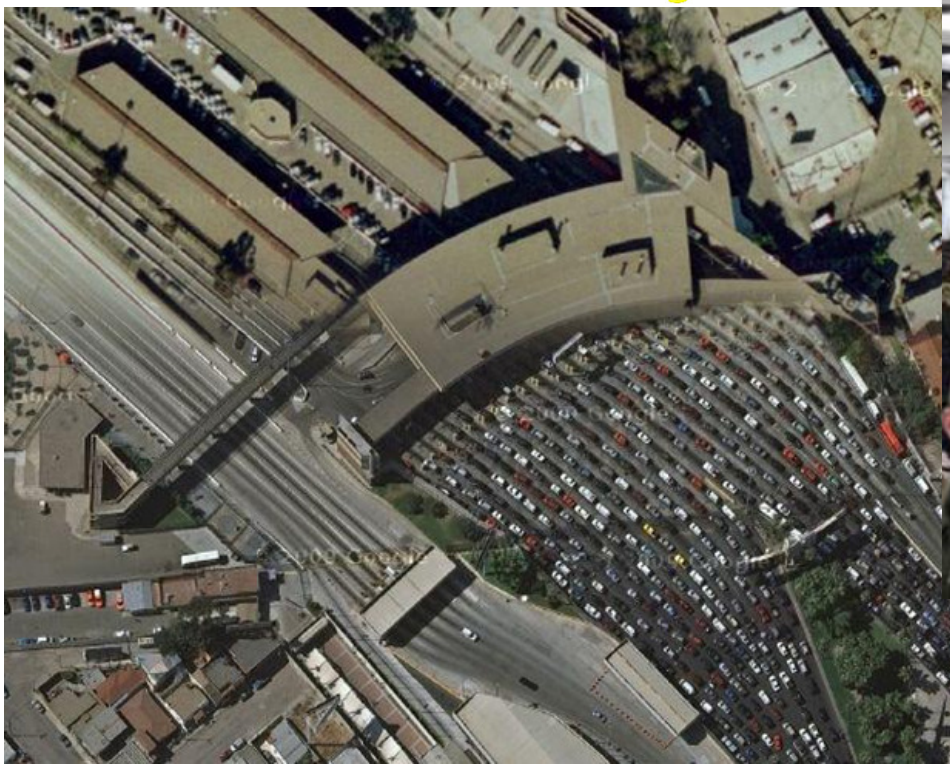
Why Automated Border Clearance

The Border Control challenge

Facilitate legitimate travel an trade without compromising **security** or **privacy** in a **cost** effective manner

…with increasing demand and limited resources



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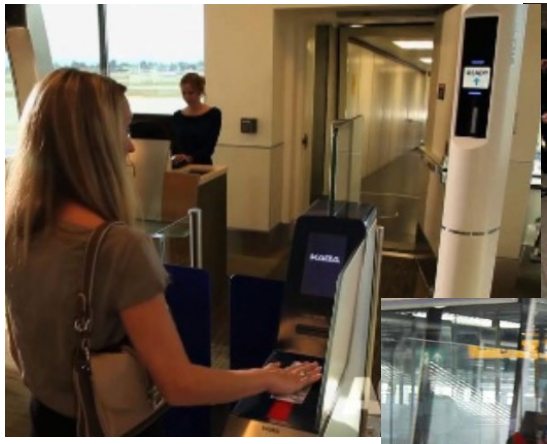
Why Automated Border Clearance

eGates can authenticate identity claims to assist officials in the inspection process…



- Face, finger, iris,…
- eMRTD, MRTD, no token,…
- One stage, two stage,…
- One door, two door,…
- etc.

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Why Automated Border Clearance

Other types of ABC systems can be used to authenticate identity claims to assist officials in the inspection process…

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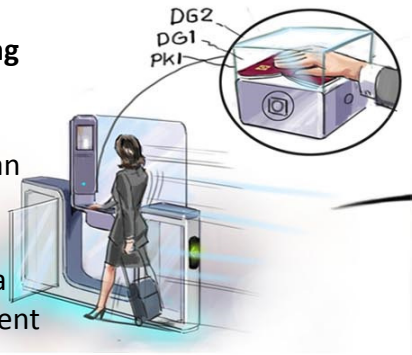
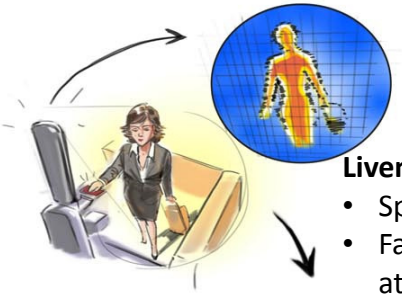
What are ABC Performance measures

Document Processing
- Failure to read
- Speed to read
- Failure to detect an illegitimate document
- Failure to accept a legitimate document
- User error



Biometric Processing
- Failure to acquire
- Speed to acquire
- Failure to enroll (sample quality)
- Speed of comparison
- Failure to detect an imposter (FAR)
- Failure to accept a genuine (FRR)



Liveness Detection
- Speed to process
- Failure to detect an attack
- Failure to accept a legitimate sample

Officer Oversight
- False alarms require manual inspection
- False accepts impact security

Utilization
- Outreach (who can use)
- Coverage (how many can use)
- Location (main flow)
- Intuitive
- Availability

Satisfaction
- Speed, Ease-of-Use, Privacy-sensitive

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How well do ABC implementations perform

ABC Outreach, Placement and Configuration

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How well do ABC implementations perform

Overall Processing

In a typical ABC analysis report, over a 1 month period, we see:

Passenger Processing	Transactions Count	End-to-end (sec)	To Decision (sec)
Total Passengers	48527	51276	
Success Rate		94.6%	
Successful Median Average		17.4	9.1
Fastest successful transaction		7.8	4.7
Slowest successful transaction		86.0	112.6
Successful 1st Quartile		15.4	7.3
Successful 2nd Quartile		17.4	9.1
Successful 3rd Quartile		21.4	12.5
Successful 4th Quartile		86.0	112.6
Unsuccessful Median Average	2749	7.7	5.1
Slowest unsuccessful transaction		181.3	182.8

Measure	Quantity	Description
Max Throughput Day	2402	Passengers per day
Max Throughput 15 Mins	94	Passengers per 15 mins

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How well do ABC implementations perform

Utilization

The percentage of eligible travelers who use the ABC is dependent on factors such as ease-of-use, availability, outreach, and – location, location, location. If not part of the primary process flow, ABC systems will not get the expected traffic

January 2014	Monthly eGate Transactions	Eligible Passengers	% of eligible
LHR T1	71,271	146,136	48.8
LHR T3	125,458	250,294	50.1
LHR T4	77,682	154,437	50.3
LHR T5	152,965	307,481	49.7
Gatwick South	136,343	258,829	52.7
Overall eGate usage	**563,719**	**1,117,177**	**50.5%**

NOTE
UK: Mixed eligibility groups
NL: Similar metrics; eGates not currently in primary flow; must detour to use. Plan to reconfigure in the next few months

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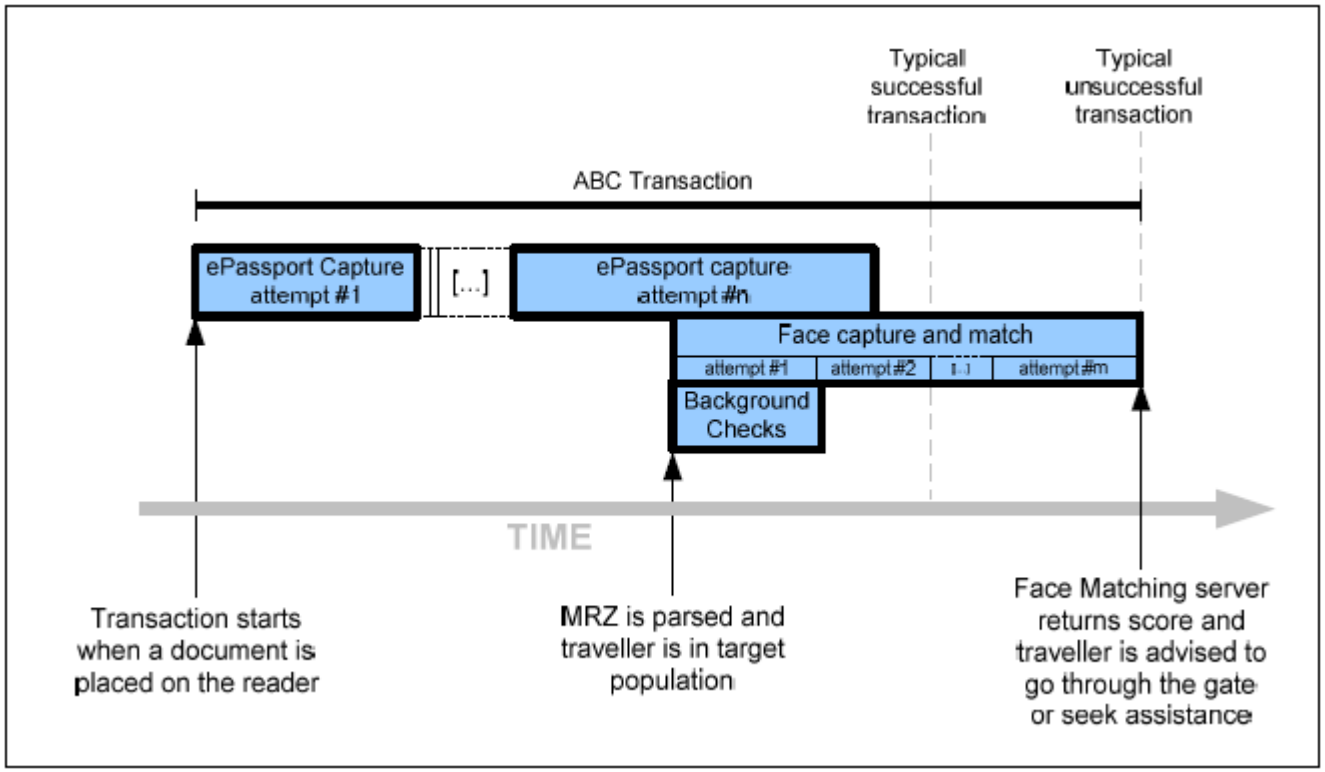
How well do ABC implementations perform

End-to-End Transaction Time: Multiple influencers impact overall transaction time; the user, the technology, and the environment to name a few



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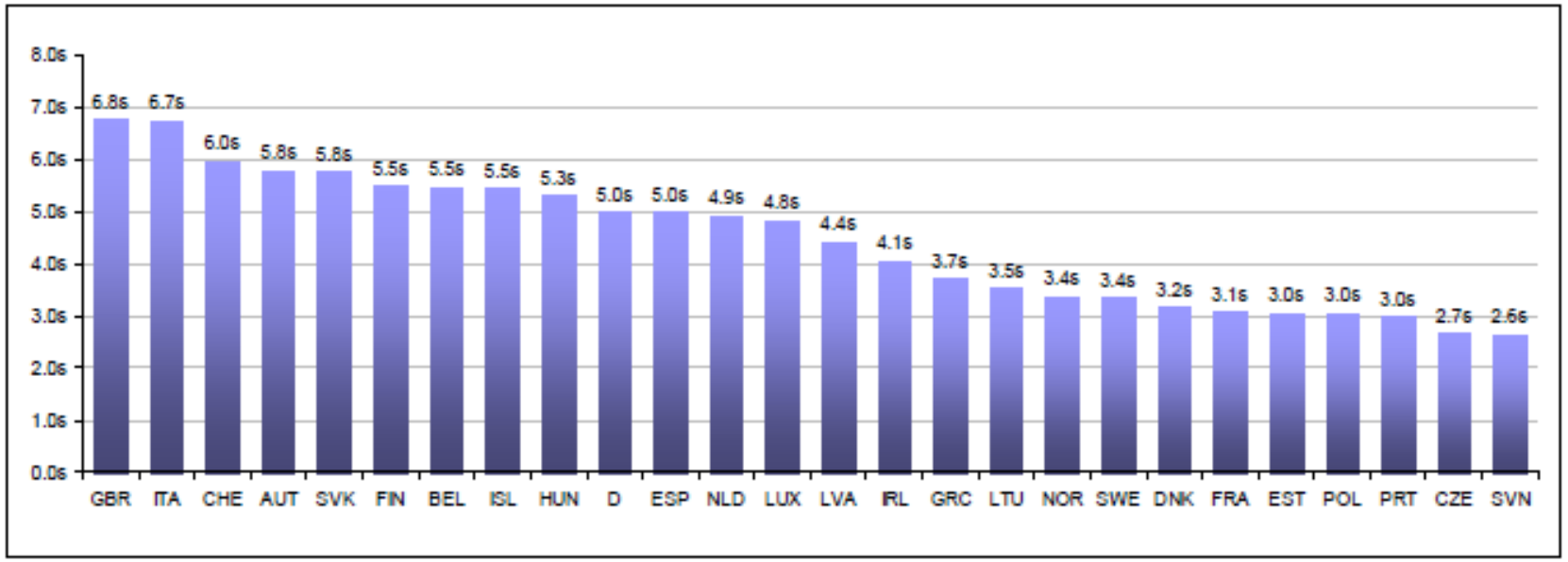
How well do ABC implementations perform

Document Processing

The overall average passport reading time was 5.93 seconds.



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How well do ABC implementations perform

Document Processing

In one ABC study which included the processing of 216,546 travel documents that were processed:

FAILURE RATE	FAILURE DESCRIPTION	FAILURE REASON
8.13%	Background Check	Blacklisted traveler
3.41%	Document is not an ePassport	User Error
1.20%	Passive Authentication Failure	Some Country Signer Certificates were not available
0.67%	Document MRZ data differs from Electronic data	Typically Read Error due to OCR problem
0.52%	Document Issued to a Traveler Under 18	User Error
0.27%	Document MRZ Checksum is Invalid	Typically Read Error due to OCR problem
0.11%	Document Issued to a Non-EEA National	User Error
0.01%	Document not a Passport (ID Card, Residence Permit, etc.)	User Error
0.07%	Document Issued by a Non-EEA Country	User Error
0.02%	Document Expired	User Error

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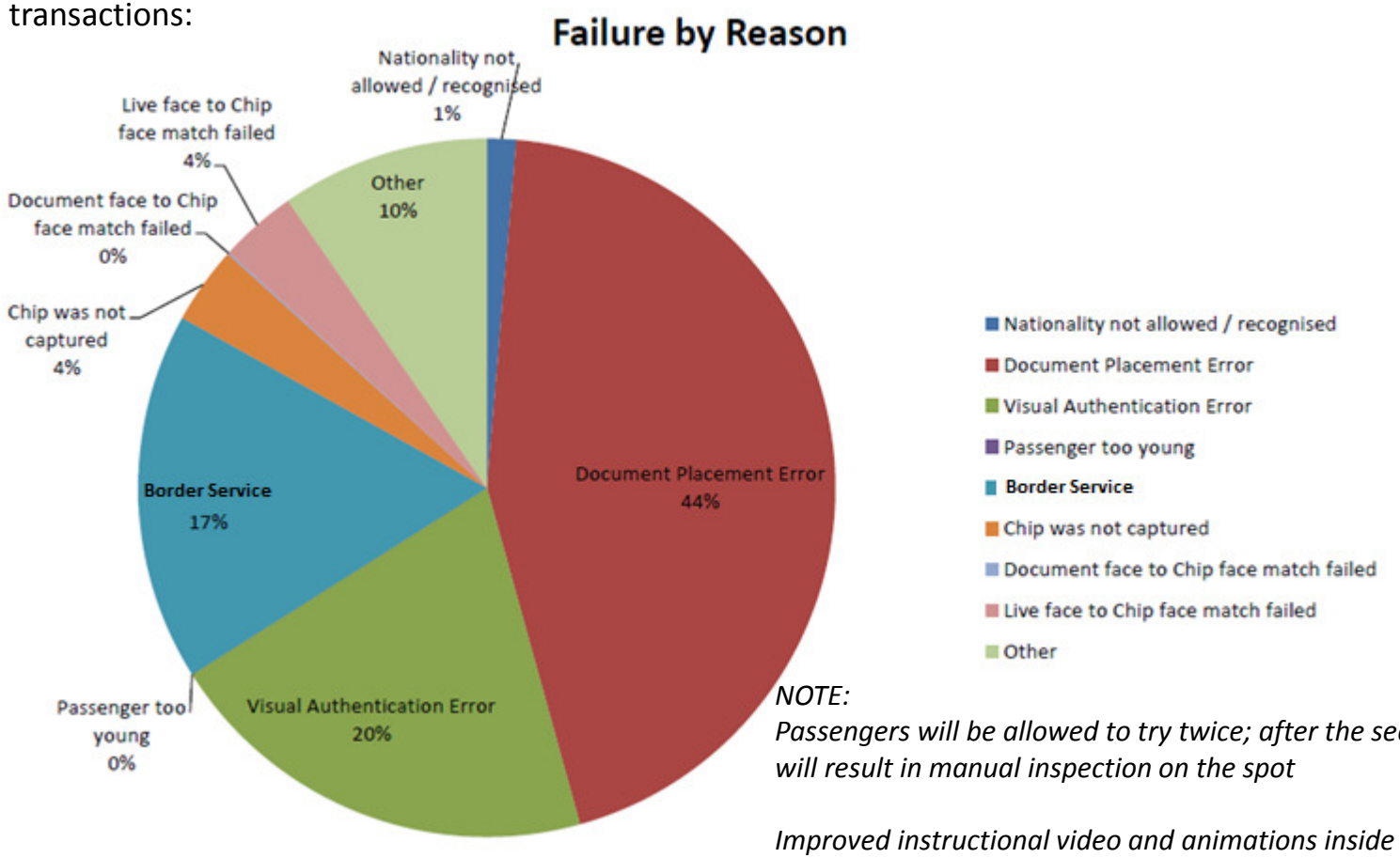
How well do ABC implementations perform

Overall Processing

In a typical ABC analysis report, over a 1 month period, we see a breakdown of UNSUCCESSFUL transactions:



NOTE:
Passengers will be allowed to try twice; after the second attempt, it will result in manual inspection on the spot

Improved instructional video and animations inside the gate.

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How well do ABC implementations perform

Biometric matching error rates are sensitive and the government agencies we are working with did not wish to share this information to the general public.

That said, the error rates are in line with Frontex's ***Best Practice Technical Guidelines for Automated Border Control (ABC) Systems***, where their recommendations are:

FACE: FAR 0.1%, FRR 5%
The configuration of the face verification algorithm SHALL ensure a security level in terms of the False Accept Rate (FAR) of at least 0.001 (0.1 per cent). At this configuration (comparison threshold) the FRR SHOULD NOT exceed 0.05 (5 per cent). It is RECOMMENDED that the achievable performance of the face verification algorithm is measured by an independent test laboratory or an official agency. The operating agency SHOULD NOT rely on performance figures given by the algorithm provider only.

FINGER: FAR 0.1%, FRR 3%
The configuration of the fingerprint verification algorithm SHALL ensure a security level in terms of FAR of 0.001 (0.1 per cent). At this configuration (comparison threshold) the FRR SHOULD NOT exceed 0.03 (3 per cent).

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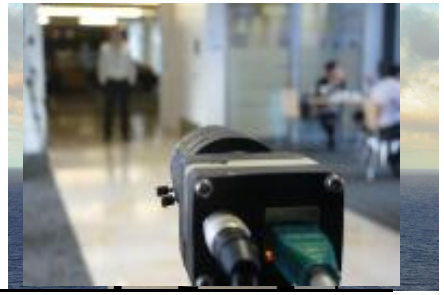
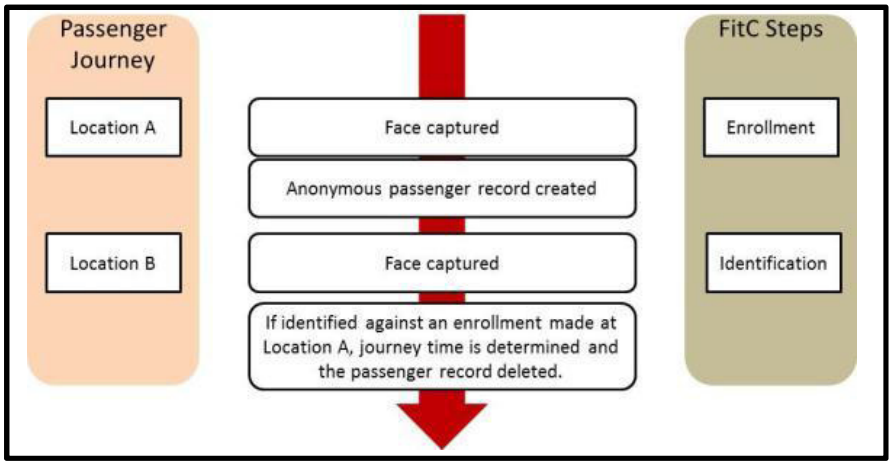
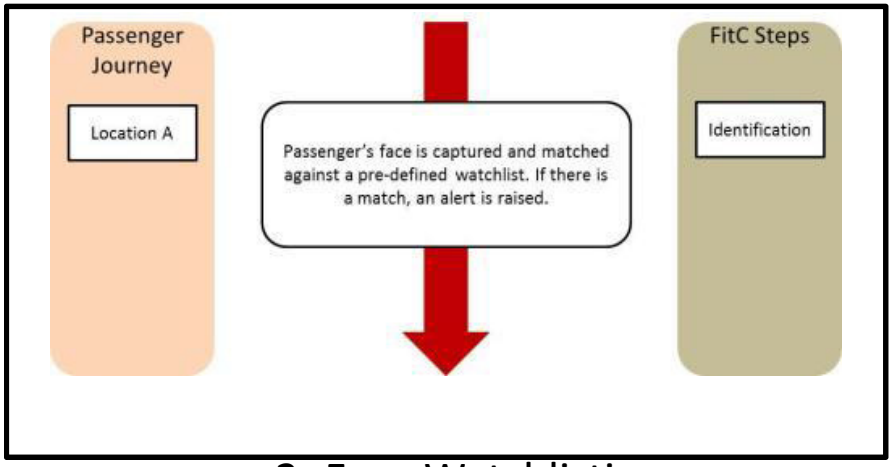
How well can passive (surveillance) ABC perform

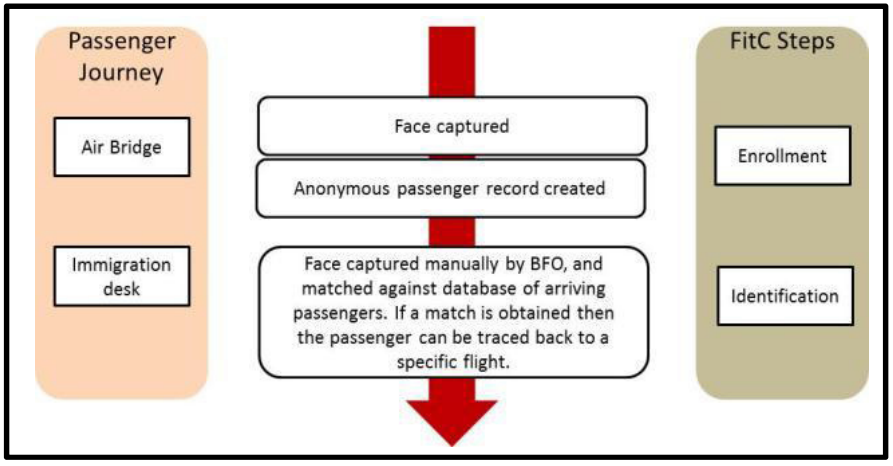




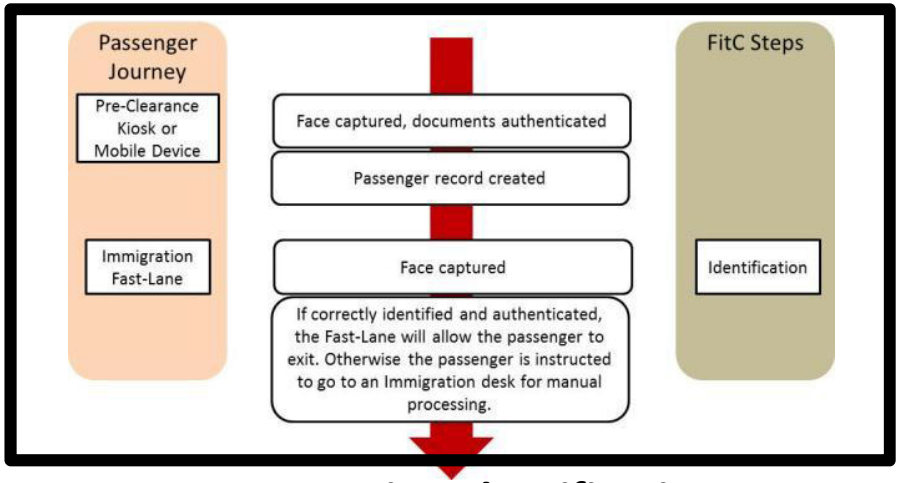
1 - Passenger Timing



2- Face Watchlisting



3 - Forgotten Origin



4 – Passive Identification

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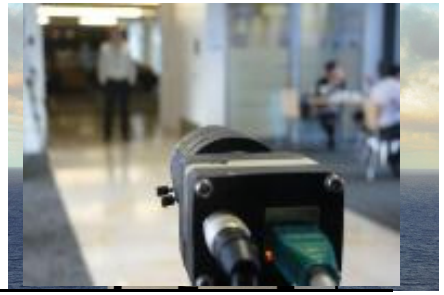
How well can passive (surveillance) ABC perform



CSF	Target	Actual
Capture Rate	≥70%	75%
TPIR	≥10%	12.5% / 11.3%
FNIR	≤2%	1.4% / 0.0%

1 - Passenger Timing

CSF	Target	Actual
Capture Rate	≥70%	78%
TPIR	≥70%	69.2%
FNIR	≤2%	0.8%

2- Face Watchlisting

CSF	Target	Actual
Capture Rate	≥70%	78%
TPIR	≥90%	100%
FNIR	≤1%	0%

3 - Forgotten Origin

CSF	Target	Actual
Capture Rate	**≥90%**	**Unknown**
TPIR	**≥95%**	**100%**
FNIR	**≤0.5%**	**0%**

4 – Passive Identification

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Performance Measurement in ABC and Surveillance Scenarios

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